CS-E4190

Cloud Software and Systems

Communication styles

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Based on slides
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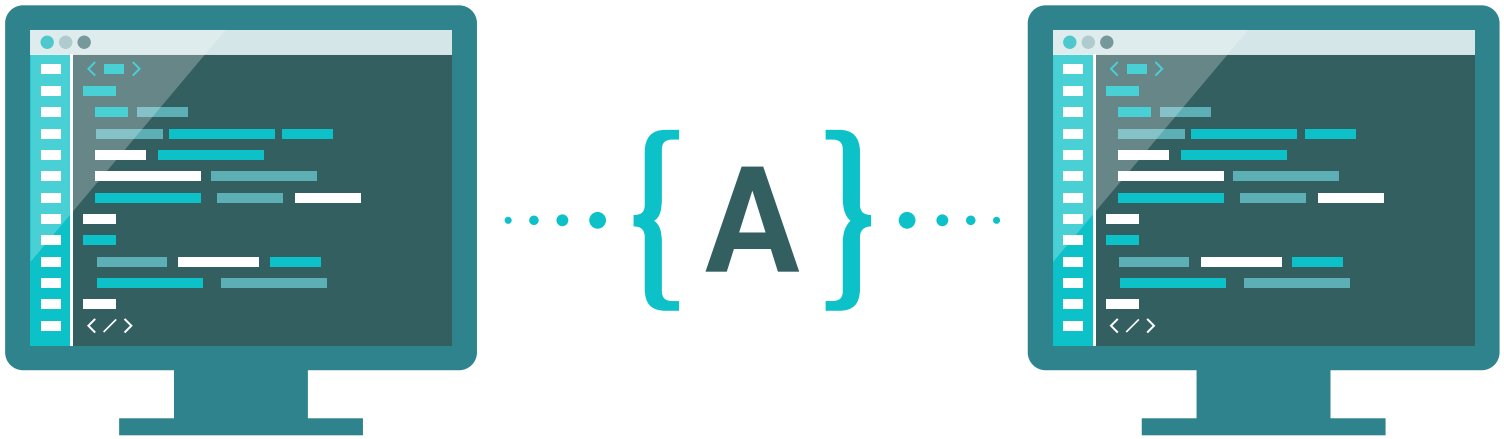
Interactions between remote components



Approaches used in the cloud

- synchronous blocking
- asynchronous non-blocking
- request-response
- event-driven

Image source: GRPC: A high performance, open-source universal RPC framework

Inter-process communication in the cloud

Communication between microservices

- Representational State Transfer (REST)
  - resource-oriented
- Remote Procedure Calls (RPC)
  - action or operation-oriented
- message broker
  - publish-subscribe, message queues
- shared data source
  - through a filesystem or database

Source: Sam Newman, "Building Microservices", 2nd edition, O'Reilly Media, 2021 ■ Chapter 4

Remote procedure calls

Overview

- network-agnostic protocol to request services
- interface similar to calling a function (procedure)

Serialization

- converting structured data in a form suitable for data exchange or storage
- also called marshalling in the RPC context

Interface definition language

- specifies operations, the related parameters and data types
- programming language-independent for interoperability between heterogeneous software components

gRPC

Overview

- open-source remote procedure call solution
- programming language and platform-independent

Protocol buffers

- default interface description language and serialization format

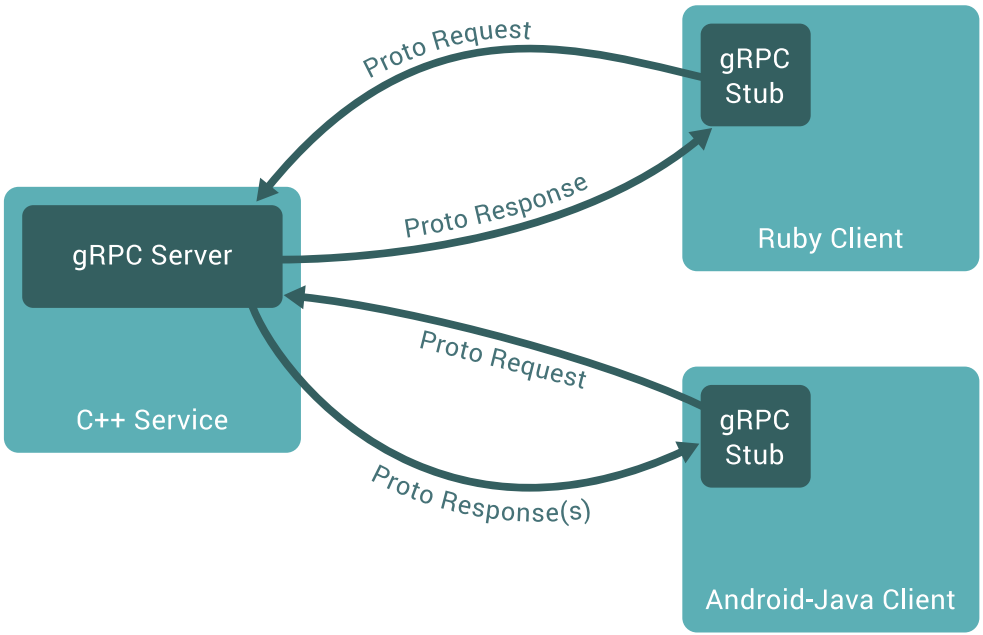


Image source: GRPC: A high performance, open-source universal RPC framework

Message brokers

What is a message broker?

- middleware enabling different applications / services to exchange information irrespective of underlying platforms
  - offer developers standardized ways to handle data flows
  - takes care of storing (e.g., in a queue) and delivering messages
- primarily used for event-driven communication
  - producers emit events and consumers find / react to these events

Publish / subscribe

- producer publishes message to a topic
- consumer subscribes to a topic and obtains related messages
- inherently one-to-many communication pattern

Source: IBM Cloud Education, "Message Brokers", January 23, 2020; and Sam Newman, "Building Microservices", 2nd edition, O'Reilly Media, 2021 ■ Chapter 5